Conservation status of *Siphloplecton* species in northern North America

(Insecta: Ephemeroptera: Metretopodidae)

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ABSTRACT

Three species of the mayfly genus Siphloplecton have been reported from northern North America. Siphloplecton basale and S. interlineatum are rather widespread, but *S. costalense* is only known from New Jersey in the north. Each of these three species plus four others are known from southeastern North America. *Siphloplecton basale* and *S. interlineatum* have been considered rare in Indiana, but we have new data from large and medium river habitats during winter and very early spring that suggest they are more common. We have associated larvae for the first time with *S. costalense*, and we suspect that this discovery will allow for better recognition of the species based on this, the more commonly collected metamorphic stage.

Introduction

Our study focusses on three species of mayflies, or the insect order Ephemeroptera, from the genus *Siphloplecton* (family Metretopodidae). Little or nothing is known of the behavior and basic biology of these species in Indiana and northern North America, other than that the larvae are found in rivers in autumn through early spring; the short-lived adults emerge in early spring and fly near the water. What little we do know about them comes mostly from studies in Florida and the southeastern USA. Seven species of *Siphoplecton* live in North America. Three of these seven species occur in the northern part of this region and are known to have rather sparse distributions (Berner 1978, Berner & Pescador 1988), including Indiana (Randolph & McCafferty 1998, Jacobus & McCafferty 2006). Two of these occur in Indiana, *Siphloplecton basale* and *S. interlineatum* (Jacobus & McCafferty 2006), one of which occurs on the state endangered species list; the other one is a southeastern species that has been found in one New Jersey location, *S. costalense* (McCafferty 2009), but the record is questionable (McCafferty et al. 2010).

Larvae are identified primarily by the structure of abdominal gills (Berner 1978).

Materials and Methods

We studied specimens archived at Purdue University to confirm or correct their identifications and data about where and when they have been found in the past. We visited two locations, the Wabash river at Patoka island in Gibson County (Figure 1) and the Tippecanoe river at Winamac (Figures 2 and 3) and observed and made note of their natural habitat. We then collected specimens with a D-framed dip net, extracted them with forceps and placed them into vials of ethanol. Our specimens were then examined and photographed in the laboratory (Figure 4). We returned to the Winamac locale and collected larvae, which we returned alive to the laboratory for observation and rearing to the adult stages. Specimens were also collected from the type local of *S-Costalense* in Virginia. These specimens were compared to recent and historic material and evaluated for potential diagnostic characters. New specimens studied will be deposited in the Purdue Entomological Research Collection.

Results

The larvae we collected from the Wabash River, near Patoka Island, did not have ventral flaps on the anterior gills, which is consistent with them belonging to *S. interlineatum*. The water conditions when we visited the Wabash River were muddy with little to no emergent vegetation growth near the edge of the river. We found the specimens among dead branches and leaves that were submerged at the edge of the river. We found only a few specimens at this location. Other locations with greater human impact yielded no specimens. . New data from the Kankakee River, Wabash River, White River and Tippecanoe River expand our concept of the species' range in Indiana (Jacobus et al. 2015).

The larvae we collected from the Tippecanoe River, near Winamac, did have ventral flaps on the anterior gills, which is consistent with them belonging to *S. basale*. The water conditions when we visited the Tippecanoe River in February were clear with an abundance of emergent vegetation near the edge of the river. We found the specimens among this emergent vegetation. We found an abundance of the specimens at this location. Other locations in the same river and the nearby Eel River, with greater human impact, yielded no specimens. On our return trip, the water was higher and muddier, and we found larvae in dead leaves in moderate current, similar to the Wabash habitat. We have other new Indiana data available for this species from several locales, however, that expand its known range in the state (Jacobus et al. 2015).

The larvae that were collected in Virginia had gills with ventral flaps, which are similar to those of *S. basale*. This was an unexpected discovery, but it is consistent with a past report of the larva that has been considered erroneous.

Conclusions

Our field studies confirmed the continued existence of at least two *Siphloplecton* species in Indiana, being more abundant and widespread than previously thought. Based on preliminary observations, these species do appear to be impacted by human activities and influences. *Siphloplecton basale* may be the less common of the two species in the state, and so it should be added to the **endangered** list. Based on our research and collecting, the status of *S. interlineatum* appears to have improved, so its status should be changed from endangered to **threatened** in the state (Jacobus et al. 2015). However, on a continental scale, these species may be more common than previously considered. These statements should be verified with proper identification of the species, though, which may prove to be problematic, especially in light of the unexpected gill characteristics of what has been assumed to be *S. costalense*. Metamorphic stage associations are needed to clarify the actual species present, given that our observations of gill morphology did not always align with previous assumptions.

Figure 1. Sampling White River side channel of Wabash River near Patoka Island.. 2 Feb 2016.

Figure 2. Tippecanoe River at Winamac. 20 Feb 2016.

Figure 3. Sampling Tippecanoe River emergent vegetation habitat.

Figure 4. S. basale from Tippecanoe River; Diagnostic feature indicated.

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